IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants:	Tienteh CHEN et al.	§	Confirmation No.:	4418
Serial No.:	10/613,495	§	Group Art Unit:	1794
Filed:	07/02/2003	§	Examiner:	Bruce H. Hess
For:	Inkjet Recording Materials	§	Docket No.:	200209928-1

APPEAL BRIEF

Mail Stop Appeal Brief – Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Date: January 20, 2010

Sir:

Appellants hereby submit this Appeal Brief in connection with the above-identified application. A Notice of Appeal was electronically filed on December 18, 2009.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST 3
II. RELATED APPEALS AND INTERFERENCES 4
III. STATUS OF THE CLAIMS 5
IV. STATUS OF THE AMENDMENTS 6
V. SUMMARY OF THE CLAIMED SUBJECT MATTER 7
VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL 9
VII. ARGUMENT 10
A. Claims 1-4, 6 and 7 10
B. Conclusion 13
VIII. CLAIMS APPENDIX 15
IX. EVIDENCE APPENDIX 17
A. Declaration Under 37 C.F.R. § 1.131 17
B. Declaration Under 37 C.F.R. § 1.132 38
X. RELATED PROCEEDINGS APPENDIX 49

I. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, L.P. (HPDC), a Texas Limited Partnership, having its principal place of business in Houston, Texas. HPDC is a wholly owned affiliate of Hewlett-Packard Company (HPC). The Assignment from the inventors to HPDC was recorded on November 10, 2003, at Reel/Frame 014676/0866.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

III. STATUS OF THE CLAIMS

Originally filed claims:	1-20.
Claim cancellations:	5, 8, 10 and 17.
Withdrawn claims:	9, 11-16 and 18-20.
Added claims:	None.
Presently pending claims:	1-4, 6-9, 11-16 and 18-20.
Presently appealed claims:	1-4, 6 and 7.

IV. STATUS OF THE AMENDMENTS

No claims were amended after the final Office action dated October 20, 2009.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

This section provides a concise explanation of the subject matter defined in each of the independent claims, referring to the specification by page and line number or to the drawings by reference characters as required by 37 C.F.R. § 41.37(c)(1)(v). Each element of the claims is identified with a corresponding reference to the specification or drawings where applicable. The specification references are made to the application as filed by Appellants. Note that the citation to passages in the specification or drawings for each claim element does not imply that the limitations from the specification and drawings should be read into the corresponding claim element. Also note that these specific references are not exclusive; there may be additional support for the subject matter elsewhere in the specification and drawings.

Claim 1 is drawn to a print medium (2)[1] comprising an ink-receiving layer (4) and an absorptive, coated paperbase (6) selected from the group consisting of coated, calendered paper, coated uncalendered paper and cast coated paper.[2] The ink-receiving layer is present on the coated paperbase from about 3 to about 7 grams per square meter (g/m^2)[3] and the ink-receiving layer comprises at least one hydrophilic or water-soluble polymer[4] which is present in the ink-receiving layer from about 60% to about 90% based on the total weight of the ink-receiving layer and a cross-linking agent.[5] The coated paperbase has a Sheffield smoothness less than approximately 20 and a Sheffield porosity greater than zero and less than approximately 10. The cross-linking agent is present from approximately 0.1% to approximately 5% based on the weight of the hydrophilic or water-soluble polymer,[6] and is selected from the group consisting

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[1] Fig. 1; specification p. 4, lines 9-17, para. [0011].

[2] Specification p. 9, lines 14-20, para. [0020].

[3] Specification p. 11, lines 12-13, para. [0026].

[4] Specification p. 4, lines 12-13, para. [0011].

[5] Specification p. 10, lines 26-27, para. [0023].

[6] Specification p. 6, lines 26-27, para. [0015].

of a boric acid or salts thereof, an epoxy based agent, an aldehyde based agent, a blocked aldehyde agent, an active halogen based agent, an active vinyl based compound, an aluminum alum, an isocyanate compound, and a derivative thereof.[7]

[7] *ibid*, lines 7-24, para. [0015].

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-4, 6 and 7 are unpatentable under 35 U.S.C. § 103(a) as being obvious over applicants' alleged statement of the prior art in the *Declaration Under 37 C.F.R. § 1.131* filed on August 24, 2005 (**Evidence Appendix A**).

VII. ARGUMENT

A. Claims 1-4, 6 and 7

At issue in this case is a passage in the *Declaration Under 37 C.F.R. § 1.131* (hereinafter referred to as "*the 131 Declaration*"), in the invention disclosure document attached thereto, which states as follows:

> The heart of the invention is the combination of very thin layer of polymeric or swellable ink receiving layer on a commercial off set and cast coated paper. Neither the composition nor the paper base used in this invention is new but the combination is novel.[8] [emphasis added]

The Examiner's position is that

> In their 131 Declaration of 08/24/2005, applicants acknowledge that "Neither the composition nor the paper base used in this invention is new . ..". The presence of mordants in this composition clearly identifies it as one that is ink receiving. Applicants further acknowledge on pages 1 and 2 of their specification that coated paper bases and receiving layers containing hydrophilic polymers, hardening agents and mordants are well known in the ink jet recording art. Consequently, use of a known ink jet recording base in combination with a known ink jet recording layer would have been obvious to one of ordinary skill in this art in the absence of unexpected results.

Appellants respectfully submit that the specified combination of the ink-receiving layer composition, its specified thickness range, and the absorbent, coated paper base, and its specified characteristics, was contrary to conventional wisdom at the time the invention was made, and therefore, novel and non-obvious. One reason that this combination was counter to conventional wisdom is that absorbent paperbases would be reasonably expected to suffer from increased cockling and wrinkling due to absorbed ink vehicle if the thickness of the ink-receiving layer were reduced from the conventional >25 g/m^2 to the range of claim 1, as discussed in more detail below.

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[8] *The 131 Declaration*, p. 2 of the appended Invention Disclosure, third paragraph (Description).

Moreover, the ordinarily skilled person lacking the guidance of Appellants' disclosure, would not have been able to reasonably predict which of a variety coated paper bases would meet the specific criteria of Sheffield smoothness and Sheffield porosity required by claim 1 (*i.e.*, Sheffield smoothness < about 20 and Sheffield porosity >0), as illustrated by the list of coated paperbases in Table 1 of the specification.[9] Because it was commonly thought, prior to the present invention, that non-photobase paper does not provide high quality images, one of ordinary skill in the art at the time the invention was made would not have been led to the specific combination of claim 1. The skilled person would have had no reasonable expectation that the claimed combination could provide a photographic image quality print.

As Appellants explained in the background section of the specification, ink-receiving layers of print media typically range from about 5 to 40 g/m^2 on photobase or paperbase.[10] It was generally known in the art that paperbases tend to cockle and wrinkle when inkjet ink is printed on them, which decreases the image quality and glossiness of the printed image, and the color gamut of the printed image is typically much lower than that of an image printed on photobase paper.[11] This is also explained in Dr. Chen's *Declaration Under 37 C.F.R. § 1.132* filed June 18, 2009 (hereinafter "*the 132 Declaration*") (**Evidence Appendix B**).[12]

Therefore, in order to achieve high image quality, the customary practice prior to the instant invention was to use photobase papers as the substrate in print media instead of paperbase papers, as indicated in the specification.[13] As photobase papers are typically pulp papers laminated between polyethylene layers,[14] they do not readily absorb the ink vehicle and it is, therefore, necessary to

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[9] Specification p. 10, line 31 - p. 11, line 2 (Table 1), paragraph [0024].

[10] Specification p. 2, lines 19-26, paragraph [0004].

[11] Specification p. 2, lines 15-18, paragraph [0003].

[12] *The 132 Declaration* p. 2, paragraph 5.

[13] Specification p. 1, lines 30-34, paragraph [0002], and p. 2, lines 11-14, paragraph [0003].

[14] Specification p. 1, lines 32-33, paragraph [0002].

employ a "high" coatweight of the ink-receiving layer, such as >25 g/m^2 to absorb the ink vehicle.[15]

The 132 Declaration states, with respect to the prior art, that "it is well known that photo base paper is the substrate of choice to obtain high quality images using an inkjet printer." Prior to the inventive paper base print medium, non-photo base paper was not used to obtain high quality images. As explained by Dr. Chen, "it is well documented that photo base paper does not readily absorb ink due to the presence of the polyethylene layer on its surface." Because polyethylene is impermeable to ink solvents, a high coatweight of the ink receiving layer which is capable of absorbing ink and ink solvents is necessary to prevent smearing, bleeding, mottling, and coalescence of the inkjet print.[16]

The detailed description section of the specification discloses that the claimed coated compositions in combination with the claimed coated paperbases provided print media having superior image quality in comparison to the commercially available print media.[17] Example 5 of the detailed description compares the performance of print media with the same 5.5 g/m^2 ink-receiving layer on absorbent, coated paperbases, photobases and uncoated paperbases. The print media that had an absorbent coated paperbase exhibited the best overall performance in gamut, gloss uniformity, K_{od} and humid fastness. These print media that used an absorptive coated paperbase instead of a photobase showed improved humid bleed and humid color shift.[18]

Dr. Chen explains in *the 132 Declaration*, that it was unexpectedly discovered that the quality of print images using the claimed print medium having an ink receiving layer and an absorptive coated paper base could be substantially enhanced to equal or exceed the image quality of photo-based print media if a thin coating (*i.e.*, in the range of about 3 to about 7 g/m^2) of the ink receiving layer is

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[15] Specification p. 2, lines 1-4, paragraph [0002].

[16] *The 132 Declaration* p. 2, paragraph 4.

[17] Specification p. 18, lines 3-7, paragraph [0041].

[18] Specification p. 20, line 5 - p. 22, line 2, paragraphs [0044]-[0046].

placed on the paper base's surface, to allow the ink vehicle to pass through and reach the absorptive paper base. Indeed, Dr. Chen explains, when print images on commercially available photo base print medium were compared to images on the inventive paper base print medium, the resultant image quality as measured by various indicia such as improved permanence, improved light and air fastness, and improved humid bleed and humid color shift, was significantly better for an image on the inventive print medium.[19] This result would not have been reasonably expected by one of ordinary skill in the art at the time the invention was made in light of the conventional view that absorptive paper bases were generally unsuitable substrates for producing photo image quality prints, especially without using a much thicker ink-receiving layer than that specified in claim 1. Appellants submit that, at best, one skilled in the art would have expected that reducing the coatweight of an ink-receiving layer on a coated paper base would have provided a cheaper print medium, but not a photoimage quality one.

Thus, the inventors' discovery that an absorbent paper base substrate in combination with an ink-receiving layer coatweight of about 3 to about 7g/m^2 (as per claim 1) provides photographic image quality printed images was contrary to conventional wisdom and would have been unexpected by one of ordinary skill in the art at the time the invention was made.

Claims 2-4, 6 and 7 depend from claim 1 and are non-obvious for at least the same reasons expressed above regarding claim 1. Based on the foregoing, Appellants respectfully submit that the rejections of the claims in this first grouping be reversed, and the claims set for issue.

B. Conclusion

For the reasons stated above, Appellants respectfully submit that the Examiner erred in rejecting all pending claims. It is believed that no extensions of time or fees are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such

[19] *The 132 Declaration* p. 2.

extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required (including fees for net addition of claims) are hereby authorized to be charged to Hewlett-Packard Development Company's Deposit Account No. 08-2025.

Respectfully submitted,

/Carol G. Mintz/

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Fort Collins, CO 80528-9599

VIII. CLAIMS APPENDIX

1. A print medium comprising:

an ink-receiving layer and an absorptive, coated paperbase selected from the group consisting of coated, calendered paper; coated, uncalendered paper and cast coated paper; the ink-receiving layer being present on the coated paperbase from about 3 grams per square meter to about 7 grams per square meter and the ink-receiving layer comprising at least one hydrophilic or water-soluble polymer which is present in the ink-receiving layer from about 60% to about 90% based on the total weight of the ink-receiving layer and a cross-linking agent, and the coated paperbase having a Sheffield smoothness less than approximately 20 and a Sheffield porosity greater than zero and less than approximately 10, said cross-linking agent is present from approximately 0.1% to approximately 5% based on the weight of the hydrophilic or water-soluble polymer and is selected from the group consisting of a boric acid or salts thereof, an epoxy based agent, an aldehyde based agent, a blocked aldehyde agent, an active halogen based agent, an active vinyl based compound, an aluminum alum; an isocyanate compound, and a derivative thereof.

2. The print medium of claim 1, wherein the ink receiving layer is present from approximately 4 grams per square meter to approximately 6 grams per square meter.

3. The print medium of claim 1, wherein the ink receiving layer comprises at least one water-soluble polymer, a cross linking agent, a mordant, inorganic particles, and at least one surfactant.

4. The print medium of claim 3, wherein the at least one water-soluble polymer comprises at least one polyvinyl alcohol; the cross-linking agent comprises boric acid; the mordant comprises at least one of diallyldimethyl-ammonium chloride, a cationic latex, or aluminum triformate; and the inorganic particles comprise cationic, superfine colloidal silica.

6. The print medium of claim 3, wherein the at least one surfactant comprises at least one nonionic, organosilicone surfactant.

7. The print medium of claim 3, wherein the at least one surfactant is at least one polysiloxane-polyethylene oxide compound or at least one polysiloxanepolyethylene oxide-polypropylene oxide compound.

IX. EVIDENCE APPENDIX

A. Declaration Under 37 C.F.R. § 1.131

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Chen et al.

Serial No.: 10/613,495

Filed: July 2, 2003

For: INKJET RECORDING MATERIALS

Confirmation No.: 4418

Examiner: P. Schwartz

Group Art Unit: 1774

Attorney Docket No.: 2858.01-5607US

NOTICE OF EXPRESS MAILING

Express Mail Mailing Label Number _____

Date of Deposit with USPS. _____

Person making Deposit. _____

DECLARATION UNDER 37 C.F.R. § 1.131

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The undersigned, Tienteh Chen, Richard J. McManus, Tony Pidding, and Barbara Walczak, each declares and states:

1. I am an inventor or co-inventor of the invention described in one or more of the claims of U.S. Patent Application 10/613,495.

2. I am informed and believe that a communication from the U.S. Patent Office was mailed on or about March 24, 2005, regarding the above-referenced application. I am informed and believe that claims 1-8 were rejected under 35 U.S.C. 103 as assertedly being obvious over Nakano et al., U.S. Patent Application Publication US2003/0186003 A1, filed March 31, 2003, in combination with other references.

3. We conceived and/or reduced to practice the subject matter of claims 1-8 of U.S. Patent Application 10/613,495 in a NAFTA or WTO member country before the filing date of the Nakano et al. reference, *i.e.*, before March 31, 2003.

4. To show conception and/or reduction to practice of the subject matter of claims 1-8 of U.S. Patent Application 10/613,495 before March 31, 2003, attached hereto as Exhibit A is a copy of an invention disclosure (redacted for dates) and Exhibit B, a graph evidencing reduction to practice before the filing date (March 31, 2003) of the Nakano et al. reference.

5. The invention disclosure indicates that the invention includes an "ink receiving layer on a commercial off set and cast coated paper." (Exhibit A, page 2). The invention disclosure further discloses that the ink receiving layer is present at 3-5 GSM (*i.e.*, grams per square meter). (*See, Id.*) Exhibit B discloses the use of Zanders supergloss base paper (cast coated) in the print medium, wherein the Zanders supergloss base paper possesses the Sheffield smoothness and porosity characteristics of claim 1. (*See*, Exhibit B and as-filed Specification, paragraph [0024], Table 1 indicating the Sheffield smoothness and porosity characteristics of the Zanders supergloss base paper).

5. Accordingly, Exhibits A and B demonstrate possession and/or reduction to practice of the elements of claims 1-8 before the filing date of the Nakano et al. reference.

6. I hereby declare that all statements are made on my own knowledge, are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both under § 1001 of Title 18 of the United States Code, and that such willful statements may jeopardize the validity of the application or any patent issues therefrom.

Tientch Chen — Date: 6/6/2005

Richard J. McManus — Date: 5/27/05

Tony Pidding

27-MAY-05
Date

Barbara Walczak

5/27/05
Date

Barbara Walczak

Document in Prol aw

invent

Disclosure No.

Invention Disclosure - DBi Document No. 6190

PD No.	Date Received	Collection
200209928	**10/27/02**	**IPG**

General Information

Title Inkjet Recording Materials with High Image Quality and Performace

Abstract This invention describes the composition and construction of a inkjet recording materials. The inkjet recording materials of this invention has superior color gamut, Kod, humid bleed and humid fastness.

Projects Vegas

Products Everyday Photo Glossy Paper

Attachments

Attachments

Vegas_2_Trial_Formulations.xls - [redacted] four scale-up formulations for Zanders (Uploaded by Tienteh Chen)

vegas_data.xls - [redacted] Vegas Weekly Photoscreening (Uploaded by Tienteh Chen)

Inventor Information

Inventors

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Description of Invention

Problems Solved
1. color gamma
2. Kod
3. light fastness
4. humid bleed
5. humid color shift

Prior Solutions
1. use photo based paper instead of paper based paper
2. high coatweight (>25 GSM) on photo based paper to absorb ink vehicle
3. multipayer coatings to seperate dye from ink vehicle and to improve coalescence
4. using mixtures of different water soluble polymers to achieve necessary IQ, et.al

Description The heart of this invention is the combination of very thin layer of polymeric or swellable ink receiving layer on a commerical off set and cast coated paper. Neither the composition nor the paper base used in this invention is new but the combination is novel. The main components of the ink receiving layer are (1) mixtures of two polyvinyl alcohols with 80 to 88% hydrolysis for optimum coalescence (2) boric acid as crosslinker to improve wet smudge and dry to touch(3) polysiloxane-polyethyleneoxide surfactant (Trade name Silwet) to reduce haze and mottle problem and (4) aluminum salts (aluminum chloride, aluminum formate) or poly(DADMAC) as mordants (5) cationic superfine colloidal silica (e.g. Ludox CL) to enhance Kod. The paper base used in this invention are coated paper (calendered or uncalendered) or cast coated paper.

Advantages Advantages of this invention are:
1) much lower coatweight than the high quality inkjet paper based on resin coated paper (swellable or porous). Usually 3-5 GSM is enough.
2) single layer coating
3) color gamut is superior to any other swellable or porous inkjet paper
4) black density (Kod) is higher than other swellabe or porous inkjet paper
5) humid bleed and humid color shift are much better than media based on photo based paper
6) light fastness is comparable to the media cost much higher

Invention History

Published No

Announced No - 5/1/03 - The name of this program is "Vegas". This product intended to replace Metro and would be named "the Glossy Everyday Photo Paper". The product plan to be released Spring of 2003.

Disclosed No

Next Three Months Yes

Described Yes - Descrsibed in notebook 2645-187 and 188 on July 11/2002. First described the evaluation of formulations for Vegas project.

Built Yes - 7/11/02

Government Contract No

Related Disclosure No

Innovation Workshop No

Witnesses

Witnesses	**Julio Alonso**	Hewlett-Packard Company	San Diego
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Classification

Recommended Classification IPG: Marking Materials/Media

Legal Techword **media coatings - non-porous - -**

Keywords inkjet media, swellable media, everyday photo paper, color gamut, polyvinylalcohol, aluminum formate, aluminum triformate, ludox CL, high gloss and Silwet surfactant

Administrative Record

Date Submitted October 16, 2002 11:48AM

Legal Clerk	**Trisha Melcher**	Hewlett-Packard Company	Corvallis
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PD Number 200209928

Date Received by Legal October 27, 2002

	Rev. 1a	Rev. 1b	Rev. 1c	Rev. 1d	5	6	7	8	9
	60	60	60	60					
	40	40	40	40					
	0	0	1	5					
ormate	2	2	0	0					
	2	2	2	2					
	10	10	10	10					
	0.0%	0.5%	0.5%	0.5%					

Percent Solids =	1	1	1	1	
Sample Size =	8	8	8	8	

	Percent Solids of Starting Materials	
Mowiol 8-88	2	%
Mowiol 15-79	15.	%
Catiofast CS	3	%
Aluminum Diformate	4	%
Boric Acid		%
Ludox CL	30.	%
Silwet L-7210	10	%
Pluronic 25R4	10	%
	4	%
		%
		%
		%
		%
		%
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		%
		%
		%
		%
		%
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				1	
					%
					grams

ghts(g)	% Solid	1	2	3	4	5	6	7	8	9	10
	22	26.793	26.793	27.030	26.106						
	15.4	25.517	25.517	25.743	24.863						
	30	0.000	0.000	0.330	1.595						
rmate	40	0.491	0.491	0.000	0.000						
	3	6.549	6.549	6.607	6.381						
	30.8	3.190	3.190	3.218	3.108						
		17.459	17.459	17.071	17.946	-4.000	-4.000	-4.000	-4.000	0.000	0.000
		14	14	14	14						
	100		0.40	0.40	0.40	0					
	100	0.4									

Photo Screening Dashboard

Thom Brown
10/27/200
Week 23

Wee
Sample
Labe
Projec
Raw data link

DJ970c/Chinook file = spunge2prem+phtobst.970 or spunge2phtobst.970
Ink = Chinook 6.1
Firmware = 6
Image Quality
Coalescence - (rank 1-5
DOI
Gamut CIELab Volumes
Gamut Munsell Volumes
Gloss/Haze Uniformity
Gloss - Averag
Gloss - Std Dev
Gloss - Min
Gloss - Max
Gloss - Unimage - min
Gloss - min colo
L* min
Kod
Permanenc
Humid Bleed (mils) worst colo
Humid Bleed (mils) k halo
Humid Bleed (µ) worst color
Humid Bleed (µ) k halo
Humid Color Shift - ΔE94) avg 10 gray
Lightfade Fadeometer Glass
Pure cyan
Pure magent
Pure yellow
Failure Mode
Years to fail for Failure Mode
AF1 - 2 wee
Pure cyan
Pure magent
Pure yellow
AF1 - 4 wee
Pure cyan

Pure magent
Pure yellow
Waterdriptastnes
Wet Smudg

Malibu, Pele/Iris file = spunge2prem+phtobst.vip or spunge2photglsbst.vip
Ink = pele / iris
Firmwar
Porous Media Print Mode?
Dry to touch
Image Quality
Coalescence - (rank 1-5
DOI
Gamut CIELab Volumes
Gamut Munsell Volumes
Gloss/Haze Uniformity
Gloss - Averag
Gloss - Std Dev
Gloss - Min
Gloss - Max
Gloss - Unimage - min
Gloss - min colo
L* min
Kod
Permanenc
Humid Bleed (mils) worst colo
Humid Bleed (mils) k halo
Humid Bleed (µ) worst color
Humid Bleed (µ) k halo
Humid Color Shift (ΔE94) avg 10 gray
Lightfade Fadeometer Glass
Pure cyan
Pure magent
Pure yellow
Failure Mode
Years to fail for Failure Mode
AF1-2 wee
Pure cyan
Pure magent
Pure yellow
AF1-4 wee
Pure cyan
Pure magent
Pure yellow
Waterdriptastnes
Wet Smudg

Week 32								
Archie SU2 66D1 Control	Cabo	TT2645-24-1	TT2645-24-2	TT2645-24-3	TT2645-23-1	TT2645-23-2	TT2645-23-3	Archie SU2 66D1 Control
02-32-0 Photo	02-32-0 Photo	02-32-0 VEGAS	02-32-0 VEGAS	02-32-0 VEGAS	02-32-0 VEGAS	02-32-0 VEGAS	02-32-0 VEGAS	02-35-0 Photo
..\..\mtl\Photo Screening\Waiting For Air Fade 2002\Week 32\week 32.xls								..\
3.0	5.0	4.0	4.0	3.0	4.0	3.0	3.0	3.5
4.0	4.3	3.5	3.5	3.5	3.7	3.5	3.7	4.0
19	33	8	8	12	9	13	11	31
448566	396387	439968	471740	456228	456254	469419	396025	416707
1715	1528	1684	1798	1743	1743	1790	1526	1601
Poor	Good	Good	Good	Good	Average	Good	Good	Good
30	28	10	10	14	13	15	15	33
14	2	2	3	3	3	4	5	7
17	25	8	7	11	9	12	10	25
52	31	14	14	19	18	21	25	43
35	1	6	6	8	10	5	7	13
Black 50%	Black 100%	genta 50%	Black 50%	Cyan 100%	Cyan 100%	Cyan 100%	Cyan 100%	Black 50%
6.2	14.1	7.9	3.7	4.1	7.9	5.3	17.7	6.8
2.22	1.83	2.04	2.38	2.40	2.23	2.25	1.52	2.21
10	18	7	6	7	6	7	7	5
6	13	3	3	3	4	3	4	3
251	455	165	152	165	150	185	173	137
155	323	84	79	74	94	81	97	81
4.8	5.1	2.9	2.3	1.6	3.0	2.2	4.4	4.3
								7.9
								13.8
								46.9
								Pure Cyan
								7.9

137	67	409	346	229	278	253	383	120
2.	4.	1.	1.	1.	2.	2.	2.	3.
4.0	5.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0
4.5	4.5	4.5	4.0	3.5	4.5	4.0	4.0	4.3
32	33	11	10	10	12	11	15	42
442358	405448	459408	463741	433217	459512	472376	473666	432265
1693	1560	1754	1770	1660	1754	1801	1805	1657
Average	Good	Good	Good	Good	Good	Good	Good	Average
35	33	11	12	11	17	16	20	37
9	8	1	2	2	3	3	4	8
25	25	10	9	9	11	11	13	31
53	49	13	14	13	19	19	26	55
28	1	3	3	4	6	8	4	24
Cyan 50%	Black 100	Cyan 100	Cyan 100	Black 100	Black 100	Magenta 1	Cyan 50%	Cyan 50%
3.8	9.6	2.6	2.4	5.1	3.2	2.2	2.2	4.0
2.43	2.01	2.60	2.58	2.28	2.65	2.71	2.78	2.43
7	13	4	6	5	4	5	5	5
4	10	3	3	3	3	3	3	3
168	325	112	150	135	112	114	130	124
89	246	64	74	71	71	66	79	79
3.5	4.6	2.6	3.0	3.9	3.0	2.8	4.3	5.6
								83.0
								234.8
								70.9
								Dhue (R-B
								27.8
116	53	375	254	302	173	241	207	100
2.	4.	2.	2.	2.	2.	2.	2.	3.

Week 35								
Cabo	AS2605-84-1	AS2605-84-2	AS2605-88-3	AS2605-85-2	AS2605-85-3	AS2605-85-4	Archie SU2 66D1 Control	Cabo
02-35-0 Photo	02-35-0 VEGAS	02-35-0 VEGAS	02-35-0 VEGAS	02-35-0 VEGAS	02-35-0 VEGAS	02-35-0 VEGAS	02-36-0 Photo	02-36-0 Photo
\mtl\Photo Screening\Waiting For Air Fade 2002\Week 35\week 35.xls								
5.0	3.5	3.5	3.5	3.5	3.5	3.5	4.0	5.0
4.5	3.5	3.0	3.0	3.5	3.5	3.3	4.0	4.5
27	5	5	9	9	7	11	26	30
380061	446709	424294	480738	456597	453823	475248	419559	390458
1469	1708	1628	1831	1744	1734	1811	1611	1506
Good	Good	Good	Good	Good	Good	Good	Average	Good
27	6	7	12	10	10	14	35	29
3	1	1	3	2	2	2	11	3
22	5	5	8	8	7	10	21	23
31	7	10	16	15	11	17	56	32
5	2	5	7	7	4	6	35	5
lack 100%	enta 100%	enta 100%	enta 100%	Cyan 100%	lack 100%	lack 100%	Cyan 100%	lack 100%
14.5	3.5	7.4	2.6	3.6	5.4	2.7	6.5	14.3
1.80	2.50	2.16	2.65	2.56	2.19	2.61	2.20	1.82
11	6	7	6	6	6	5	8	16
8	2	3	4	3	3	3	5	13
274	150	180	145	145	142	124	206	414
191	53	71	91	76	76	76	119	318
5.0	3.8	3.6	2.8	3.2	3.6	3.1	5.8	5.7
4.1	19.9	15.2	9.2	15.0	9.9	6.3	8.6	3.5
2.1	88.2	1000.0	1000.0	13.7	11.5	7.8	16.4	1.5
8.4	1000.0	1000.0	210.1	1000.0	1000.0	36.6	34.4	5.6
Magenta i	D(B) in D	D(B) in D	Pure Cyan	Magenta i	Magenta i	Magenta i	Pure Cyan	Magenta i
1.9	11.4	12.5	9.2	10.3	5.9	4.3	8.6	1.4
							0.0	24.2
							0.0	35.6
							2.9	16.9
							1.7	38.5

							0.2	47.8
							2.9	19.2
62	280	306	370	187	175	135	120	73
4.	2.	2.	2.	2.	2.	3.	3.	4.
5.0	3.5	3.0	3.5	3.0	3.5	3.5	4.0	5.0
4.5	4.3	4.3	4.3	4.0	4.5	4.3	4.3	4.5
32	5	8	12	11	10	10	42	36
402598	458519	459074	475840	448747	452918	467350	426659	400654
1550	1751	1753	1813	1716	1731	1783	1636	1543
Good	Good	Good	Good	Good	Good	Good	Average	Good
32	7	11	16	11	11	13	38	33
7	1	2	3	1	1	2	9	7
24	5	8	11	10	9	9	31	26
47	8	13	20	13	12	15	56	48
4	3	3	4	1	2	6	25	3
Black 100	Black 100	Black 100	Black 100	Black 100	Black 100	Black 100	Cyan 50%	Black 100
9.5	2.5	2.7	1.5	2.0	3.3	1.5	4.3	9.7
2.01	2.71	2.59	2.93	2.75	2.49	2.89	2.40	1.99
10	6	7	6	5	5	5	7	13
7	3	3	3	3	2	3	4	10
251	145	188	145	137	114	124	170	325
188	76	74	84	76	61	79	97	249
6.0	5.6	5.2	6.0	4.0	4.1	5.2	5.8	5.5
66.2	1000.0	1000.0	1000.0	1000.0	1000.0	116.6	97.4	34.9
78.1	272.0	69.9	671.6	78.4	32.6	21.1	234.8	47.9
7.6	1000.0	1000.0	1000.0	1000.0	1000.0	34.1	49.9	6.3
Neutral Dh	D(B) in D	D(B) in D	D(B) in D	D(B) in D	D(B) in D	D(B) in D	Dhue (R-B	Neutral Dh
5.4	12.9	11.2	10.9	9.0	8.8	9.4	27.8	5.1
							0.8	27.5
							0.0	44.1
							2.9	18.8
							2.7	38.1
							0.4	63.6
							2.5	21.1
52	172	142	206	127	211	133	114	166
4.	3.	2.	3.	2.	3.	2.	2.	4.

	Week 3							Week 38
Jet Print PRO	TT 2645-39-4	AS 2605-87 2	AS 2605-87 3	AS 2605-87 5	AS 2605-87 6	Archie SU2 66D1 Control	Cabo	TT2645-2
02-36-0 Photo	02-36-0 Vega	02-36-0 Vega	02-36-0 Vega	02-36-0 Vega	02-36-0 Vega	02-38-0 Photo	02-38-0 Photo	02-38-1 VEGAS
5.0	4.0	4.0	3.0	3.0	4.0	3.0	5.0	4.0
4.3	4.0	3.5	3.5	3.0	3.5	4.0	4.5	4.0
28	14	13	12	10	11	34	28	15
386724	500946	456949	456686	450031	456752	438073	405554	490457
1493	1903	1745	1744	1720	1744	1677	1561	1865
Good	Good	Good	Good	Good	Good	Average	Good	Good
17	16	14	13	13	11	35	31	19
5	4	1	2	2	1	9	8	3
14	13	12	11	9	10	25	22	13
26	21	16	17	15	13	53	47	21
0	8	2	6	5	4	28	7	7
Unimaged	Black 50%	Black 100%	Black 100%	Black 100%	Cyan 100%	Cyan 100%	Black 100%	Black 100%
16.9	2.5	4.3	4.3	5.2	4.8	6.9	9.1	1.6
1.73	2.71	2.43	2.43	2.37	2.37	2.24	2.03	2.89
30	7	6	6	7	7	7	14	7
15	5	3	3	2	2	5	11	3
762	183	150	157	165	165	183	356	168
384	130	71	66	56	58	122	277	86
4.4	4.4	4.7	4.2	3.3	3.1	4.2	11.9	12.4
2.4	10.5	12.9	8.1	9.0	12.2			
2.3	39.2	18.3	7.4	43.7	1000.0			
6.0	130.8	52.4	20.8	1000.0	1000.0			
Magenta i	Magenta i	Cyan in N	Neutral Dh	Pure Cyan	Pure Cyan			
1.9	9.3	11.4	6.7	9.0	12.2			
25.8	0.4	1.2	1.0	0.2	0.4			
43.4	0.2	0.8	0.6	0.5	1.2			
13.1	0.2	3.3	3.8	3.3	4.2			
53.3	2.4	1.4	1.3	0.8	0.6			

60.4	2.7	0.4	0.4	0.9	0.4			
22.3	0.6	3.9	3.1	2.3	4.2			
50	204	202	260	253	212	226	68	175
4.	2.	2.	2.	2.	2.	3.	4.	3.
5.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0
4.5	4.3	4.0	4.0	3.0	4.0	4.3	4.5	4.0
39	17	10	9	11	11	40	31	6
404328	487774	460172	458309	457367	460124	442411	388710	463925
1556	1856	1757	1750	1747	1757	1693	1500	1770
> unimage	Good	Good	Good	Good	Good	Average	Good	Average
19	21	13	12	11	12	36	28	20
3	3	2	1	1	1	7	2	6
14	15	10	9	10	10	30	24	6
24	24	15	13	14	13	52	29	24
0	6	5	4	4	3	22	4	18
Unimaged	Cyan 50%	Black 100	Black 100	Black 100	Magenta 1	Cyan 50%	Black 100	Black 100
10.3	1.7	2.4	2.3	2.6	2.1	3.6	14.6	7.0
2.00	2.88	2.67	2.66	2.66	2.74	2.48	1.81	2.12
17	7	5	5	4	5	7	12	6
6	5	3	3	3	3	4	9	4
432	178	122	117	112	119	165	310	147
142	114	79	79	69	71	91	234	89
4.6	4.9	4.3	3.3	4.2	4.2	5.5	5.6	8.0
8.6	59.5	113.2	38.4	1000.0	1000.0			
10.6	32.4	41.4	35.4	1000.0	1000.0			
6.4	43.5	52.5	32.6	1000.0	1000.0			
Pure Yello	Neutral Dh	Yellow in	Yellow in	D(B) in D	D(B) in Dmin			
6.4	12.4	10.1	7.4	12.3	13.6			
34.0	12.8	2.1	2.7	1.4	1.8			
45.2	12.1	3.0	2.9	2.3	2.1			
16.2	1.4	2.0	3.1	4.4	3.9			
48.6	15.8	2.5	2.9	2.0	2.5			
67.7	14.5	4.4	4.3	2.6	3.5			
23.8	2.1	2.8	3.3	3.6	3.9			
50	203	177	319	188	123	122	75	297
4.	2.	2.	3.	2.	2.	3.	4.	3.

TT2645-3	TT2645-4	TT2645-5
02-38-1 VEGAS	02-38-1 VEGAS	02-38-1 VEGAS
4.0	3.0	3.0
3.7	3.5	3.5
17	10	16
499934	465387	487247
1900	1775	1854
Good	Good	Good
21	14	16
4	2	2
15	10	14
26	17	19
9	8	5
lack 100%	lack 100%	lack 100%
1.3	4.6	2.3
3.03	2.31	2.66
8	7	8
4	3	3
196	175	198
104	71	81
13.6	11.5	11.5

224	208	267
3.	3.	3.
4.0	4.0	3.0
3.5	3.5	3.5
7	8	10
505927	476961	497733
1921	1817	1892
Average	Average	Average
15	15	20
4	4	5
7	7	9
18	19	24
10	12	15
Black 100	Black 100	Magenta 100%
3.9	7.1	3.1
2.65	2.12	2.50
7	6	6
5	3	3
175	140	152
122	69	71
7.9	7.7	8.7
205	287	212
2.	3.	3.

B. Declaration Under 37 C.F.R. § 1.132

Atty. Dkt. No. 200209928-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Tienteh CHEN, et al.
Title:	INKJET RECORDING MATERIALS
Appl. No.:	10/613,495
Filing Date:	7/2/2003
Examiner:	Bruce H. Hess
Art Unit:	1794
Confirmation Number:	4418

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Dr. Tienteh Chen, hereby declare that:

1. I am a program manager at Hewlett-Packard Development Company, L.P, (HP) which is the assignee of the captioned application. I also am named as an inventor in this application.

2. I am an expert in the print media and recording material art, having conducted research in this field for over eight years. My research at HP has focused on the development of microporous and swellable recording materials for inkjet printing and I have developed three new products that have been commercialized by HP. I am a co-inventor on 48 US patents and 20 pending patent applications. More specific qualifications are set out in my *curriculum vitae*, which is attached hereto as APPENDIX A.

3. I have read and understand the non-final office action dated May 7, 2009, rejecting claims 1, 4, 6 and 7. For the reasons that follow I believe that the inventive print medium is not obvious to one of ordinary skill in the pertinent art.

The Prior Art

4. It is well known that photo base paper is the substrate of choice to obtain high quality images using an inkjet printer. Photo base paper is a pulp paper that is extruded on both sides with polyethylene. It is well documented that photo base paper does not readily absorb ink due to the presence of the polyethylene layer on its surface. As a result of the polyethylene layer, therefore, the gloss, image quality, and photo feel of the inkjet print media is greatly improved. Because of the impermeability of polyethylene to ink solvents, a high coatweight of the ink receiving layer, which is capable of absorbing ink and ink solvents, is necessary to prevent smearing, bleeding, mottling, and coalescence of the inkjet print. Typically, the coat weight of the ink receiving layer on a photo base paper, therefore, is in the range of **25 – 40 grams per square meter**. Furthermore, the high coat weight of the ink receiving layer helps to separate colorant from the ink vehicle in order to obtain proper coalescence of the image.

Well Known That Non-Photo Base Paper Does Not Provide High Quality Images

5. Prior to the inventive paper base print medium, non-photo base paper was not used to obtain high quality images. Although, paper base substrates are porous, paper base print medium cockle and wrinkle when used with inkjet printers. For example, photographs printed on a paper base medium wrinkle, have poor glossiness and an overall poor quality of the printed image as a result of a lower color gamut and color saturation in the printed image.

The Claimed Invention

6. It was unexpectedly discovered that the quality of print images using the claimed print medium having an ink receiving layer and an absorptive coated paper base was substantially enhanced to equal or exceeds the image quality of photo-based print media. As an expert in the print art field, I believe that the improved print image quality using the claimed print medium is due, at least in part, to the following three aspects of the inventive print medium:

(i) the presence of a thin coating of the ink receiving layer on the paper base's surface, which allows the ink vehicle to pass through and reach the absorptive paper base,

(ii) the ability of the paper base to quickly absorb the ink vehicle and dry the ink, and

(iii) the ability of the ink receiving layer, to concentrate the dye molecules on to the surface of the print medium, enhancing color gamut and K_{od} as illustrated below in Table I.

7. Concerning points (i) and (ii), the coat weight of the claimed ink receiving layer in the inventive print medium is in the range of 3 – 7 grams per square meter, significantly less than the coat weight of such a layer on a photo base paper of 25-40 grams per square meter. As mentioned above, the thin coating allows for the rapid passage of the ink vehicle and consequently rapid drying of the ink from the ink jet printer. Furthermore, the presence of one or more hydrophilic polymer(s) or water soluble polymer(s) in the ink layer improve image quality by enhancing ink absorption and by keeping together the components of the ink receiving layer.

8. The improved print quality of the claimed paper base print medium over photo base medium was measured using various indicia of image quality, such as improved permanence of image, improved light and air fastness of the image, and improved humid bleed and humid color shift of the printed image. Table I compares print images on commercially available photo base print medium to images on the inventive paper base print medium coated with a subgroup of four illustrative ink-receiving compositions (A – D). See Table 2 of the specification. As noted in applicants specification, ink receiving layers A, B, C, and D have the following compositions in which the amount of each component is expressed in parts by weight:

(A) Composition comprises: 60 parts of Mowiol 8-88, 40 parts of Mowiol 15-79, 10 parts of Ludox® CL; 3 parts of Agefloc WT35-VLV, 1.5 parts of boric acid, and 1.0 part of Cartabond TSI;

(B) Composition comprises: 60 parts of Mowiol 8-88, 40 parts of Mowiol 15-79, 10 parts of Ludox® CL; 1.5 parts of boric acid, and 1.0 part of Cartabond TSI ;

(C) Composition comprises: 60 parts of Mowiol 8-88, 40 parts of Mowiol 15-79, 10 parts of Ludox® CL; 3 parts of Catafix TSF, 1.5 parts of boric acid, and 1.0 part of Cartabond TSI; and

(D) Composition comprises: 60 parts of Mowiol 8-88, 40 parts of Mowiol 15-79, 10 parts of Ludox® CL; 5 parts of Agefloc WT35-VLV, 2.0 parts of boric acid.

Table I

Name	Gamut CIELab Volumes	K_{od}	Gloss/Haze uniformity	Humid bleed (μ) worst color	Humid bleed (μ) k halo	Humid color shift (ΔE94)
HP Premium Plus Glossy Paper	410,000-430,000	2.13-2.24	Poor to average	251	155	4.8
HP Everyday Photo Paper	380,000-390,000	1.83	Good	455	323	5.1
Jet Print PRO	386,724	1.73	Good	762	384	4.4
HP Brochure and Flyer	323,103	1.72	Average	488	424	3
A	439,968	2.04	Good	165	84	2.9
B	471,740	2.38	Good	152	79	2.3
C	456,228	2.4	Good	165	74	1.6
D	446,709	2.5	Good	150	53	3.8

See applicants' specification for other compositions in accordance with the claimed invention, and their test results.

9. As shown in the table above, the claimed exemplary coating compositions A, B, C and D, using the claimed ink-receiving layer in combination with the claimed paper base, show superior color space as illustrated in the first column of the Table by CIELab volumes. The superior color space of the print image on the inventive medium is better than the HP Premium Plus Glossy Paper, shown for comparison in the first row of Table I. Print medium in accordance with the claimed invention show a higher CIELab volume than commercially available coated paper bases or photo bases. The inventive print medium further enhances the density of black ink, as shown by the higher values of "K_{od}", illustrated in the 2nd column of the Table, and improves image permanence.

10. These improved image properties using the inventive print medium are unexpected, especially in light of prior art teachings that photo base paper that has a high coat weight of the ink receiving layer is required to obtain high quality images using an inkjet printer.

11. Because the photo base paper that the prior art teaches to obtain high quality images is structurally different from the inventive paper base print medium, and in particular, includes an ink receiving layer with a coatweight in the range of 25-40 grams, there is no reason to believe that one of ordinary skill in the art would expect a coated paper base with a coatweight for the claimed ink receiving layer in the 3 – 7 grams per square meter range, to result in high quality print images. Rather, one or ordinary skill in the art would expect that reducing the coat weight of the ink receiving layer would result in a deterioration of image quality. Thus, it is simply not possible to extrapolate from the photo base paper taught in the prior art to the claimed composition with its claimed paper base and claimed ink receiving layer in the 3 – 7 grams per square meter range, in the context of the claim as a whole.

12. Accordingly, based on the above analysis and data, it is my strong opinion that the claims are not-obvious to one of ordinary skill in this art.

13. Finally, I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issuing thereon.

Respectfully submitted,

Date June 18, 2009 By Tienteh Chen

Tienteh Chen

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OBJECTIVE: A challenging R&D position in the fields of organic/polymer/colloid chemistry.

MAJOR ACCOMPLISHMENTS

- 45 granted US patents 23 pending patent applications
- Developed three new inkjet media products for HP
- Extensive experience in the design and synthesis of organic/inorganic particles with controlled surface properties and functional groups.
- Extensive experience in the design and synthesis of water soluble polymers, water dispersible polymers, polymer latex, and polymer particles.
- Extensive experience in the synthesis of functional monomers (UV absorbers, dye, couplers, scavengers, activators, crosslinkers, etc.).
- Extensive experience in the synthesis of ultrafine polymer latexes from solid vinyl monomers. Prepared latexes with excellent barrier(gas, oil) properties.
- Invented novel process to treat inorganic particles with silane coupling agents in water
- Experience in the loading of organic compounds into polymer latex
- Extensive experience in the dispersion of fumed silica, fumed alumina, and boehmite in water
- Synthesis of novel amphiphilic graft and block copolymers as pigment ink dispersants.
- Synthesis of core-shell particles with inorganic core and polymeric shell for inkjet applications.
- Modification of colloidal inorganic particles via sol-gel chemistry to introduce various functional groups at the interface.
- Invented process of making self-dispersible acrylate polymers containing various functional groups.
- Loading of photographically useful compounds, such as dye, stabilizers, UV absorbers, into polymer latexes. Prepared core-shell hollow particles.
- Synthesized surface active 2-oxazoline block copolymers as water-in-oil or oil-in-water emulsifiers.
- Invented a process of making ultrafine vinyl acetate latex as primer.

EDUCATION

Ph.D. , Polymer/Colloid Chemistry — August 1983
Institute of Materials Science
University of Connecticut, Storrs, CT.
Advisor: Prof. Robert M. Fitch
Thesis Titles: I. Preparation and Characterization of Model Polystyrene Latexes with Thiosulfate Surface Groups. II. Photolysis of Water by Visible Light: Effects of Alkyl Viologens, Colloidal Silica , and Polyelectrolytes on the Efficiency of Hydrogen Production from Water

M.S., Organic Chemistry — June 1979
University of Illinois at Chicago, Chicago, Ill.
Advisor: Prof. Joseph H. Boyer
Research Project: Synthesis of Hexanitrobenzene

B.S., Chemistry June 1974
National Taiwan University, Taipei, Taiwan.
Advisor: Prof. Yau-Tang Lin
Research Project: Natural Products Analysis of Chinese Medicine

EXPERIENCES

May 2001 to present **Project Leader and Program Manager, Inkjet Media R&D, Hewlett Packard Company, San Diego, CA .**

- Technical leader for the development of premium porous inkjet photo media for the pigment ink and dye based ink.
- Coordinated team members from R&D, manufacturing, product delivery, converting, planning, finance and marketing.
- Invented novel process to modify the surface of inorganic oxides with organic silane coupling agents in water.
- Performed pilot and production coatings of multilayered inkjet photo media with multilayered curtain coating and cascade coating technology.
- Developed a top layer formulation to improve the gloss and scratch resistance of the porous inkjet photo media.
- Developed a heat fusible photo media with superior image quality and durability comprising hollow polymer particles as ink absorption layer.
- Developed a low-cost swellable (polymeric) inkjet photo media with superior image quality and permanence (light fade and humid fastness)

Mar.2000 to May 2001 **Director, Media R&D, SiPix Imaging Inc.,Milpitas, CA**

- Led development of high image quality color and monochrome heat developed thermal media.
- Developed novel process to encapsulate color leuco dyes and visible light sensitizers in polymer particles which have excellent release and barrier properties, and keeping stability.

Apr.1986 to Mar.2000 **Research Associate, Eastman Kodak Company, Rochester, NY**

- Synthesis of novel amphiphilic graft and block copolymers as pigment ink dispersants.
- Design and synthesis of organic/inorganic, organic/organic core-shell particles as fast drying porous ink jet receiver.
- Modification of colloidal inorganic particles with dye fixation functional groups at the interface with silane coupling chemistry.
- Modification of PVA by grafting and derivatization as inkjet recording materials.
- Modification of gelatin for inkjet recording materials.
- Design and synthesis of UV absorbing monomers and polymers (2-hydroxyphenyl benzotriazole, 2-hydroxybenzophenone, etc.).
- Design and synthesis of image-forming dye (or so-called coupler) monomers and polymers (acrylate and arylamide types). Photostabilization of photographic materials.
- Emulsion polymerization of solid functional monomers, which have very low water solubility.
- Design and synthesis of water dispersible and water-soluble polymers containing photographically useful groups(PUG) by solution polymerization.
- Synthesis of PUG containing monomers with various linkage groups to modify their physical properties.
- Design and synthesis of polymer addenda for the photographic materials.
- Loading of the organic compounds into the polymer latexes.
- Synthesis of core-shell latex with various surface groups.
- Synthesis of new hardeners and polymeric hardeners (crosslinkers) for

gelatin.

- Viscosity studies on the surfactant-gelatin and particle-gelatin interactions.
- Design of polymer latexes with very low gelatin-particle interactions. Stability studies of the polymer colloids.
- The use of polymer as addenda for the improvement of image dye stability.
- Design of polymer overcoat for the protection of photographic materials. Modifications of polymer latexes with attachment of gelatin on the particle surface.
- Structure-property relationship of polymer properties with compositions.
- Preparation of water-soluble polymers as addenda for the photographic materials.

Sep.1984 to Apr.1986 **Chemist I, The Glidden Company, Strongsville, OH**

- Preparation of ultrafine particle size polymer latexes (vinyl acetate, styrene-acrylic, and all acrylic) as interior primers.
- Development of high % solid vinyl acetate latexes as binders for the interior house paint.
- Development of high % solid all acrylic latexes for exterior house paint.

Sep.1983 to Sep. 1984 **Postdoctoral Fellow, Case Western Reserve University, Cleveland,OH**

Research Advisors: Profs. Morton Litt and Irvin Krieger

- Synthesis of 2-oxazoline monomers with different functional groups
- Synthesis and characterizations of living block copolymers via cationic polymerization of 2-oxazoline monomers.
- Preparation of low surface energy and surface-active block copolymers.
- Preparation of polystyrene foams with more than 95% void with surface-active block copolymer as stabilizers.
- Characterizations of the surface-active block copolymers by the contact angle and the critical micelle concentration(CMC) measurements.

Sep. 1982 to Sep. 1983 **Teaching Assistant, U. of Connecticut, Storrs, CT**

Responsible for the teaching and supervision of the experimental course on the polymer characterizations.

Sep.1976 to Aug.1977 **Research Associate, National Taiwan University, Taipei, Taiwan**

Research on the Analysis of Camphor Trees by Extraction and Gas Chromatography.

Sep.1974 to Aug. 1976 **Taiwanese Army**

TECHNICAL SKILLS Familiar with most analytical techniques in the fields of organic, polymer, and colloid and surface chemistry.

MEMBERSHIPS American Chemical Society- Division Members of Polymer Chemistry, Polymeric Materials and Engineering Science, Colloid and Interface Science, Society of Imaging Science and Technology

INTERESTS Singing, Music, Photography, and Travel

CITIZENSHIP US citizen

MARITAL STATUS Married with three children

REFERENCES Available upon request

Publications and Patents

1. Ink set and media for ink-jet printing **US7,533,980 (2009)**
2. Use and preparation of crosslinked polymer particles for inkjet recording materials. **US7,507,439 (2009)**
3. Surface modification of silica in an aqueous environment **US 7,435,450 (2008)**
4. Fused ink-jet image with high image quality, air fastness, and light stability **US7,441,886 (2008)**
5. Porous inkjet recording material **US20080008882 A1**
6. Stackable inkjet recording material **US20070275190 A1**
7. Porous inkjet recording material **US20060246239 A1**
8. Ink set and media for ink-jet printing **US20060181587 A1**
9. Porous inkjet printing substrate containing polymer-grafted mineral oxides **US20060093761 A1**
10. Ink-jet media with multiple porous media coating layers **US20060083871 A1**
11. Ink-jet media coatings including expoxy-functionalized inorganic particulates and amine-functionalized inorganic particulates **US20060083870 A1**
12. Fusible ink-jet recording materials containing hollow beads and ultrafine polymer particles **US20060045999 A1**
13. Porous inkjet recording material **US20060013971 A1**
14. Fusible inkjet media including solid plasticizer particles and methods of forming and using the fusible inkjet media **US20060038871 A1**
15. Use and preparation of crosslinked polymer particles for inkjet recording materials **US20050249896 A1**
16. Ink-jet recording medium for dye-or pigment-based ink-jet inks **US20050266181 A1**
17. Ink-jet recording medium for dye-or pigment-based ink-jet inks **US20050276936 A1**
18. Fusible inkjet recording materials containing hollow beads, system using the recording materials, and methods of using the recording materials **US20050287313 A1**
19. Fusible inkjet recording materials containing hollow beads, system using the recording materials, and methods of using the recording materials **US20050287311 A1**
20. System and a method for starch-based, slow-release oral dosage forms **US2005023697 A1**
21. Fused ink-jet image with high image quality, air fastness, and light stability **US20050174415 A1**
22. System and a method for forming a heat fusible microporous ink receptive coating **US20050191445 A1**
23. Surface modification of silica in an aqueous environment **US20050170109 A1**
24. Inkjet recording materials **US20050003113 A1**
25. Inkjet recording materials containing siloxane copolymer surfactants **US20050003112 A1**
26. Water soluble polymers as inkjet recording materials. **US 6,933,024 (2005)**
27. Imaging media containing heat developable photosensitive microcapsules. **US 6,740,465 (2004)**
28. Ink jet recording element. **US 6,677,008 (2004)**
29. Imaging media containing heat developable photosensitive microcapsules. **US20020155372A1.**
30. Ink jet recording element. **US20020155260A1.**
31. Ink jet printing method. **US20020150731A1.**
32. Ink jet printing method. **US20020149662A1.**
33. Inkjet Recording Element (Organic/Inorganic Core/Shell). **US 6,440,537 (2002).**
34. Water-Resistant Protective Overcoat for Image Recording Materials. **US 6,426,167 (2002).**
35. Inkjet Printing Method (Novel Mordant). **US 6,423,398 (2002).**
36. Inkjet Printing Method (Graft Copolymer As Pigment Ink Dispersants). **US 6,406,143 (2002).**
37. Inkjet Printing Method . **US 6,375,320(2002).**
38. Photocrosslinkable Latex Protective Overcoat for Imaging Elements. **US 6,352,805(2002).**
39. Loaded Latex Compositions with Dye and Stabilizer. **US 6,361,916(2002).**
40. Color Photographic Element Containing Speed-Improving Polymers. **US 6,316,177 (2002).**
41. Ink Jet Printing Method. **US 6,315,405(2001).**
42. Color Photographic Elements Containing Improved Polymeric Disulfonamidephenol for Scavenging Oxidized Developer. **US 6,255,045(2001).**
43. Protecting Layer For Image Recording Materials. **US 6,221,546(2001).**
44. Overcoat Materials as Protecting Layer For Image Recording Materials. **US 6,214,938 (2001).**
45. Polymer Latexes with Core-Shell Morphology. **US 6,203,973 (2001).**
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47. Hydrophilic Colloid Composition. **US 5,958,660(1999)**
48. Protective Layer for Gelatin Based AGX Photographic Products. **US 5,952,130(1999).**
49. Silver Halide photographic Material Containing A Polymer With A Photographically Useful Group Which

Is Rendered Non-Diffusible By Cross-Linking. **US 5,932,404(1999).**
50. Photographic Elements Containing 3-Alkyl Group Substituted 2-Hydroxyphenylbenzotriazole UV Absorbing Polymers. **US 5,858,633(1999).**
51. Photographic Element Containing Ultraviolet Absorbing Polymer. **US 5,766,834(1998).**
52. Process For Synthesizing Latex Polymers From Solid Monomer Particles. **US 5,747,585(1998).**
53. Attachment of Gelatin Grafted Polymer Particles to Precipitated Silver Halide Grains. **US 5,741,633(1998).**
54. Emulsion Polymerization of Solid Vinyl Monomers Containing Photographically Useful Groups. **US 5,693,461(1997).**
55. 2-Hydroxyphenyl Benzotriazole Based UV Absorbing Polymers With Particular Substituents And Photographic Elements Containing Them. **US 5,674,670(1997).**
56. Photographic Elements Containing Directly Dispersible UV Absorbing Polymers and Method of Making Such Elements and Polymers. **US 5,620,838(1997).**
57. 2-Hydroxyphenyl Benzotriazole Based UV Absoring Polymers and Photographic Elements Containing Them. **US 5,610,000(1997).**
58. Atttachment of Gelatin-Grafted Polymer Particles To Pre-precipitated Silver Halide Grains. **US 5,543,283(1996).**
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68. Photographic Elements Having Sulfoxide Coupler Solvents and Addenda to Reduce Sensitizing Dye Stain. **US 5,192,646(1993).**
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X. RELATED PROCEEDINGS APPENDIX

None.